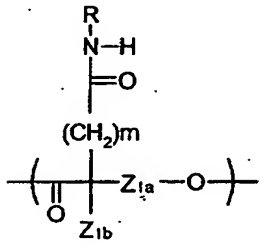
CLAIMS

1. A polyhydroxyalkanoate comprising one or more units represented by the chemical formula (1) in a molecule,

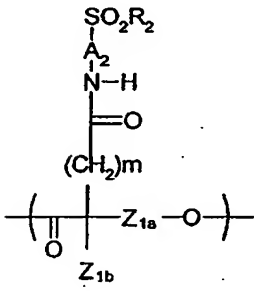


(1)

wherein R represents $-A_1-SO_2R_1$, R_1 represents OH, a halogen atom, ONa, OK, or OR_{1a}, R_{1a} and A_1 each independently represent a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure, Z_{1a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof. Z_{1b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, m represents an integer selected from 0 to 8, and when multiple units exist, R, R_1, R_{1a}, A_1, Z_{1a}, Z_{1b}, and m each independently have the above meaning for each

unit.

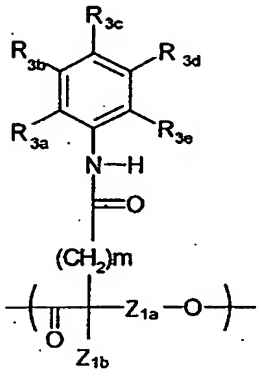
2. A polyhydroxyalkanoate according to claim 1, comprising one or more units each represented by the chemical formula (2), (3), (4A), or (4B) in a molecule as the one or more units each represented by the chemical formula (1):



(2)

wherein R_2 represents OH, a halogen atom, ONa, OK, or OR_{2a}, R_{2a} represents a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group, A_2 represents a linear or branched alkylene group having 1 to 8 carbon atoms, Z_{1a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{1b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, m represents an integer selected from 0 to 8, and when multiple units

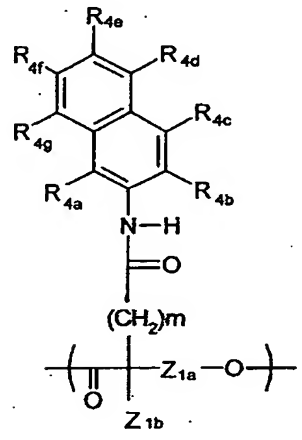
exist, A_2, R_2, R_{2a}, Z_{1a}, Z_{1b}, and m each independently have the above meaning for each unit,



(3)

wherein R_{3a}, R_{3b}, R_{3c}, R_{3d}, and R_{3e} each independently represent SO_2R_{3f} (R_{3f} represents OH, a halogen atom, ONa, OK, or OR_{3f1} (R_{3f1} represents a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group)), a hydrogen atom, a halogen atom, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an OH group, an NH_2 group, an NO_2 group, $COOR_{3g}$ (R_{3g} represents an H atom, an Na atom, or a K atom), an acetamide group, an OPh group, an NHPh group, a CF_3 group, a C_2F_5 group, or a C_3F_7 group (Ph represents a phenyl group), and at least one of these groups represents SO_2R_{3f}, Z_{3a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a

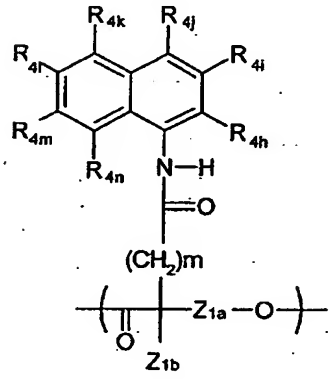
thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{3b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, m represents an integer selected from 0 to 8, and when multiple units exist, R_{3a}, R_{3b}, R_{3c}, R_{3d}, R_{3e}, R_{3f}, R_{3f1}, R_{3g}, Z_{1a}, Z_{1b}, and m each independently have the above meaning for each unit,



(4A)

wherein R_{4a}, R_{4b}, R_{4c}, R_{4d}, R_{4e}, R_{4f}, and R_{4g} each independently represent SO_2R_{4o} (R_{4o} represents OH, a halogen atom, ONa, OK, or OR_{4o1} (R_{4o1} represents a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group)), a hydrogen atom, a halogen atom, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an OH group, an NH_2 group, an NO_2 group, $COOR_{4p}$ (R_{4p} represents an H atom, an Na atom, or a K atom), an acetamide group, an OPh

group, an NHPh group, a CF_3 group, a C_2F_5 group, or a C_3F_7 group (Ph represents a phenyl group), and at least one of these groups represents SO_2R_{4o}, Z_{1a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{1b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, m represents an integer selected from 0 to 8, and when multiple units exist, R_{4a}, R_{4b}, R_{4c}, R_{4d}, R_{4e}, R_{4f}, R_{4g}, R_{4o}, R_{4o1}, R_{4p}, Z_{1a}, and Z_{1b}, and m each independently have the above meaning for each unit,

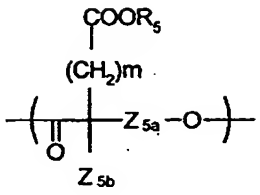


(4B)

wherein R_{4h}, R_{4i}, R_{4j}, R_{4k}, R_{4l}, R_{4m}, and R_{4n} each independently represent SO_2R_{4o} (R_{4o} represents OH, a halogen atom, ONa, OK, or OR_{4o1} (R_{4o1} represents a

linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group)), a hydrogen atom, a halogen atom, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an OH group, an NH_2 group, an NO_2 group, $COOR_{4p}$ (R_{4p} represents an H atom, an Na atom, or a K atom), an acetamide group, an OPh group, an NHPh group, a CF_3 group, a C_2F_5 group, or a C_3F_7 group (Ph represents a phenyl group), and at least one of these groups represents SO_2R_{4o}, m represents an integer selected from 0 to 8. Z_{1a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{1b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist, R_{4h}, R_{4i}, R_{4j}, R_{4k}, R_{4l}, R_{4m}, R_{4n}, R_{4o}, R_{4o1}, R_{4p}, Z_{1a}, Z_{1b}, and m each independently have the above meaning for each unit.

3. A polyhydroxyalkanoate comprising one or more units represented by the chemical formula (5):



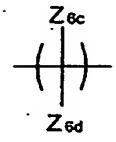
(5)

wherein R_5 represents hydrogen, a group for forming a salt, or R_{5a}, R_{5a} represents a linear or branched alkyl or aralkyl group having 1 to 12 carbon atoms, or a group having a saccharide, m represents an integer selected from 0 to 8, Z_{5a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{5b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist, R_5, R_{5a}, Z_{5a}, Z_{5b}, and m each independently have the above meaning for each unit.

4. A polyhydroxyalkanoate according to claim 1, wherein the linear alkylene chain structure represented by Z_{1a} in the chemical formula (1) is selected from the following (A) to (D):

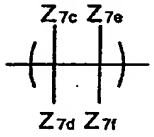
(A) when the linear alkylene chain has 1 carbon atom, in the linear alkylene chain structure represented by the chemical formula (6), one of Z_{6c} and Z_{6d}

represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,



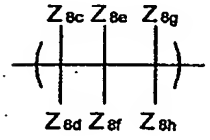
(6)

(B) when the linear alkylene chain has 2 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (7), one of Z_{7c}, Z_{7d}, Z_{7e}, and R_{7f} represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,



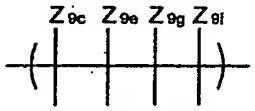
(7)

(C) when the linear alkylene chain has 3 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (8), one of Z_{8c}, Z_{8d}, Z_{8e}, Z_{8f}, Z_{8g}, and Z_{8h} represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,



(8)

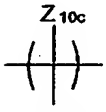
(D) when the linear alkylene chain has 4 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (9), one of Z_{9c}, Z_{9d}, Z_{9e}, Z_{9f}, Z_{9g}, Z_{9h}, Z_{9i}, and Z_{9j} represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof.



(9)

5. A polyhydroxyalkanoate according to claim 3, wherein the linear alkylene chain structure represented by Z_{5a} in the chemical formula (5) is selected from the following (A) to (D):

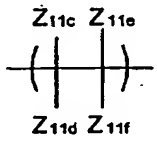
(A) when the linear alkylene chain has 1 carbon atom, in the linear alkylene chain structure represented by the chemical formula (10), one of Z_{10c} and Z_{10d} represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,



(10)

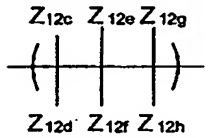
(B) when the linear alkylene chain has 2 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (11), one of Z_{11c}, Z_{11d}, Z_{11e}, and

Z_{11f} represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,



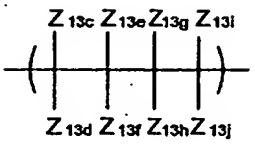
(11)

(C) when the linear alkylene chain has 3 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (12), one of Z_{12c}, Z_{12d}, Z_{12e}, Z_{12f}, Z_{12g}, and Z_{12h} represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,



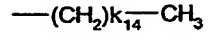
(12)

(D) when the linear alkylene chain has 4 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (13), one of Z_{13c}, Z_{13d}, Z_{13e}, Z_{13f}, Z_{13g}, Z_{13h}, Z_{13i}, and Z_{13j} represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof.



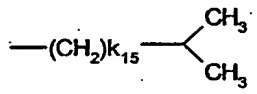
(13)

6. A polyhydroxyalkanoate according to claim 4 or 5, wherein when a substituent selected from Z_{6c}, Z_{6d}, Z_{7c}, Z_{7d}, Z_{7e}, Z_{7f}, Z_{8c}, Z_{8d}, Z_{8e}, Z_{8f}, Z_{8g}, Z_{8h}, Z_{9c}, Z_{9d}, Z_{9e}, Z_{9f}, Z_{9g}, Z_{9h}, Z_{9i}, Z_{9j}, Z_{10c}, Z_{10d}, Z_{11e}, Z_{11d}, Z_{11e}, Z_{11f}, Z_{12c}, Z_{12d}, Z_{12e}, Z_{12f}, Z_{12g}, Z_{12h}, Z_{13c}, Z_{13d}, Z_{13e}, Z_{13f}, Z_{13g}, Z_{13h}, Z_{13i}, and Z_{13j} described in the chemical formulae (6), (7), (8), (9), (10), (11), (12), and (13) represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, the substituent is selected from substituents represented by the chemical formulae (14), (15), (16), and (17):



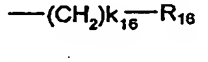
(14)

wherein k_{14} represents an integer selected from 0 to 8, and when multiple units exist, k_{14}'s each independently have the above meaning for each unit,



(15)

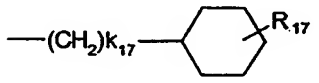
wherein k_{15} represents an integer selected from 0 to 7, and when multiple units exist, k_{15}'s each independently have the above meaning for each unit,



(16)

wherein k_{16} represents an integer selected from 1 to 8,

R_{16} represents a substituent containing a residue having any one of a phenyl structure and a thienyl structure, and when multiple units exist, k_{16} and R_{16} each independently have the above meaning for each unit,

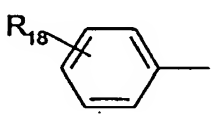


(17)

wherein R_{17} represents a substituent to a cyclohexyl group selected from an H atom, a CN group, an NO_2 group, a halogen atom, a CH_3 group, a C_2H_5 group, a C_3H_7 group, a CF_3 group, a C_2F_5 group, and a C_3F_7 group, k_{17} represents an integer selected from 0 to 8, and when multiple units exist, k_{17} and R_{17} each independently have the above meaning for each unit.

7. A polyhydroxyalkanoate according to claim 6, wherein R_{16} in the chemical formula (16), which is a residue having any one of a phenyl structure and a thienyl structure, is selected from the group of residues represented by the chemical formulae (18), (19), (20), (21), (22), (23), (24), (25), (26), (27), and (28),

the chemical formula (18) below representing a group of unsubstituted or substituted phenyl groups,

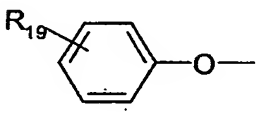


(18)

wherein R_{18} represents a substituent to an aromatic

ring selected from an H atom, a halogen atom, a CN group, an NO_2 group, a CH_3 group, a C_2H_5 group, a C_3H_7 group, a $CH=CH_2$ group, $COOR_{18a}$ (R_{18a} represents an H atom, an Na atom, or a K atom), a CF_3 group, a C_2F_5 group, and a C_3F_7 group, and when multiple units exist, R_{18}'s may be different for each unit,

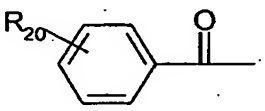
the chemical formula (19) below representing a group of unsubstituted or substituted phenoxy groups,



(19)

wherein R_{19} represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO_2 group, a CH_3 group, a C_2H_5 group, a C_3H_7 group, a SCH_3 group, a CF_3 group, a C_2F_5 group, and a C_3F_7 group, and when multiple units exist, R_{19}'s may be different for each unit,

the chemical formula (20) below representing a group of unsubstituted or substituted benzoyl groups,

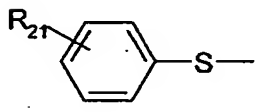


(20)

wherein R_{20} represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO_2 group, a CH_3 group, a C_2H_5 group, a C_3H_7 group, a SCH_3 group, a CF_3 group, a C_2F_5 group, and a C_3F_7 group, and when multiple units exist, R_{20}'s may

be different for each unit,

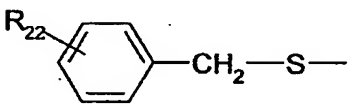
the chemical formula (21) below representing a group of unsubstituted or substituted phenylsulfanyl groups,



(21)

wherein R_{21} represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO_2 group, $COOR_{21a}$, SO_2R_{21b} (R_{21a} represents H, Na, K, CH_3, or C_2H_5, and R_{21b} represents OH, ONa, OK, a halogen atom, OCH_3, or OC_2H_5), a CH_3 group, a C_2H_5 group, a C_3H_7 group, a $(CH_3)_2$-CH group, and a $(CH_3)_3$-C group, and when multiple units exist, R_{21}'s may be different for each unit,

the chemical formula (22) below representing a group of unsubstituted or substituted (phenylmethyl)sulfanyl groups,

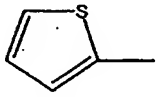


(22)

wherein R_{22} represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO_2 group, $COOR_{22a}$, SO_2R_{22b} (R_{22a} represents H, Na, K, CH_3, or C_2H_5, and R_{22b} represents OH, ONa, OK, a halogen atom, OCH_3, or OC_2H_5), a CH_3 group, a C_2H_5 group, a C_3H_7 group, a $(CH_3)_2$-CH group, and a $(CH_3)_3$-C

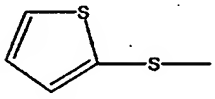
group, and when multiple units exist, R_{22}'s may be different for each unit,

the chemical formula (23) below representing a 2-thienyl group,



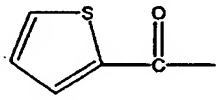
(23)

the chemical formula (24) below representing a 2-thienylsulfanyl group,



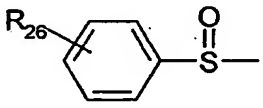
(24)

the chemical formula (25) below representing a 2-thienylcarbonyl group.



(25)

the chemical formula (26) below representing a group of unsubstituted or substituted phenylsulfinyl groups,

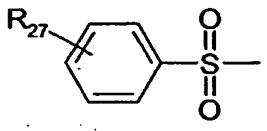


(26)

wherein R_{26} represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO_2 group, $COOR_{26a}$, SO_2R_{26b} (R_{26a} represents H, Na, K, CH_3, or C_2H_5, and R_{26b} represents OH, ONa, OK, a halogen atom, OCH_3, or OC_2H_5), a CH_3 group, a C_2H_5 group, a C_3H_7 group, a $(CH_3)_2$-CH group, and a $(CH_3)_3$-C group, and when multiple units exist, R_{26}'s may be

different for each unit,

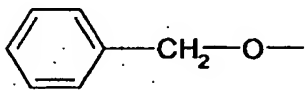
the chemical formula (27) below representing a group of unsubstituted or substituted phenylsulfonyl groups,



(27)

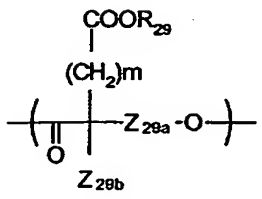
wherein R_{27} represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO_2 group, $COOR_{27a}$, SO_2R_{27b} (R_{27a} represents H, Na, K, CH_3, or C_2H_5, and R_{27b} represents OH, ONa, OK, a halogen atom, OCH_3, or OC_2H_5), a CH_3 group, a C_2H_5 group, a C_3H_7 group, a $(CH_3)_2$-CH group, and a $(CH_3)_3$-C group, and when multiple units exist, R_{27}'s may be different for each unit,

the chemical formula (28) below representing a (phenylmethyl)oxy group,



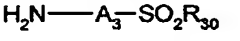
(28)

8. A method of producing a polyhydroxyalkanoate containing a unit represented by the chemical formula (1), comprising the step of subjecting a polyhydroxyalkanoate containing a unit represented by the chemical formula (29) and at least one kind of amine compound represented by the chemical formula (30) to a condensation reaction,



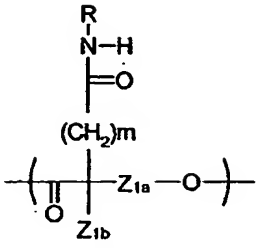
(29)

wherein R_{29} represents hydrogen or a group for forming a salt, m represents an integer selected from 0 to 8, Z_{29a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{29b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist, R_{29}, Z_{29a}, Z_{29b}, and m each independently have the above meaning for each unit,



(30)

wherein R_{30} represents OH, a halogen atom, ONa, OK, or OR_{30a}, R_{30a} and A_3 are each independently selected from groups each having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure, and when multiple units exist, R_{30}, R_{30a}, and A_3 each independently have the above meaning for each unit,

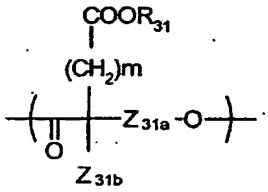


(1)

wherein R represents $-A_1-SO_2R_1$. R_1 represents OH, a halogen atom, ONa, OK, or OR_{1a}, R_{1a} and A_1 each independently represent a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure, Z_{1a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{1b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, m represents an integer selected from 0 to 8, and when multiple units exist, R, R_1, R_{1a}, A_1, Z_{1a}, Z_{1b}, and m each independently have the above meaning for each unit.

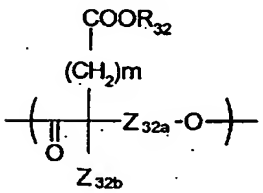
9. A method of producing a polyhydroxyalkanoate containing a unit represented by the chemical formula (32), comprising the step of hydrolyzing a polyhydroxyalkanoate containing a unit represented by

the chemical formula (31) in the presence of an acid or an alkali or the step of subjecting the polyhydroxyalkanoate to hydrogenolysis including catalytic reduction,



(31)

wherein R_{31} represents a linear or branched alkyl or aralkyl group having 1 to 12 carbon atoms, Z_{31a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{31b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, m represents an integer selected from 0 to 8, and when multiple units exist, R_{31}, Z_{31a}, Z_{31b}, and m each independently have the above meaning for each unit,



(32)

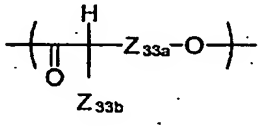
wherein R_{32} represents hydrogen or a group for forming

a salt, Z_{32a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{32b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, m represents an integer selected from 0 to 8, and when multiple units exist, R_{32}, Z_{32a}, Z_{32b}, and m each independently have the above meaning for each unit.

10. A method of producing a polyhydroxyalkanoate containing a unit represented by the chemical formula (35), comprising the steps of:

allowing a polyhydroxyalkanoate containing a unit represented by the chemical formula (33) to react with a base; and

allowing the compound obtained in the foregoing step to react with a compound represented by the chemical formula (34),



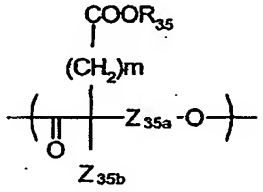
(33)

wherein Z_{33a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least

one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{33b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist, Z_{33a} and Z_{33b} each independently have the above meaning for each unit,

(34)

wherein m represents an integer selected from 0 to 8, X represents a halogen atom, and R_{34} represents a linear or branched alkyl or aralkyl group having 1 to 12 carbon atoms,



(35)

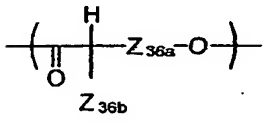
wherein R_{35} represents a linear or branched alkyl or aralkyl group having 1 to 12 carbon atoms, Z_{35a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{35b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may

be substituted by an aryl group, m represents an integer selected from 0 to 8, and when multiple units exist, R_{35}, Z_{35a}, Z_{35b}, and m each independently have the above meaning for each unit.

11. A method of producing a polyhydroxyalkanoate containing a unit represented by the chemical formula (38), comprising the steps of:

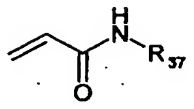
allowing a polyhydroxyalkanoate containing a unit represented by the chemical formula (36) to react with a base; and

allowing the compound obtained in the foregoing step to react with a compound represented by the chemical formula (37),



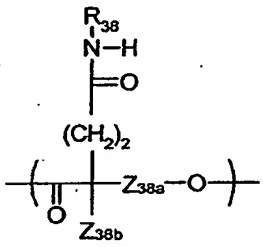
(36)

wherein Z_{36a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{36b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist, Z_{36a} and Z_{36b} each independently have the above meaning for each unit,



(37)

wherein R_{37} represents $-A_{37}-SO_2R_{37a}$. R_{37a} represents OH, a halogen atom, ONa, OK, or OR_{37b}, R_{37b} and A_{37} are each independently selected from groups each having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure, and when multiple units exist, R_{37}, R_{37a}, R_{37b}, and A_{37} each independently have the above meaning for each unit,



(38)

wherein R_{38} represents $-A_{38}-SO_2R_{38a}$, R_{38a} represents OH, a halogen atom, ONa, OK, or OR_{38b}, R_{38b} and A_{38} each independently represent a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure, Z_{38a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having

any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{38b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist, R_{38}, R_{38a}, R_{38b}, A_{38}, Z_{38a}, and Z_{38b} each independently have the above meaning for each unit.